



Accounting
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RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-212010

The Honorable Joseph R. Biden, Jr.
The Honorable Bill Bradley
The Honorable Dale L. Bumpers
The Honorable John C. Danforth
The Honorable Alan J. Dixon
The Honorable Christopher J. Dodd
The Honorable Thomas F. Eagleton
The Honorable J. James Exon
The Honorable Charles E. Grassley
The Honorable Edward M. Kennedy
The Honorable Carl M. Levin
The Honorable Howard M. Metzenbaum
The Honorable Claiborne Pell
The Honorable William Proxmire
The Honorable Donald W. Riegle, Jr.
The Honorable Paul S. Sarbanes
The Honorable James R. Sasser
The Honorable Edward Zorinsky
United States Senate



123606

Subject: Natural Gas Profit Data (GAO/RCED-84-3)

This letter responds to your December 22, 1982, request that we study the profitability of natural gas production under the Natural Gas Policy Act of 1978. In your request letter, you expressed concern that the Congress had little information on natural gas production profits and that such information was needed to develop comprehensive natural gas legislation. Based on your request and subsequent discussions with your offices, we obtained information on (1) the extent to which profit data and related financial data on natural gas production are collected by federal agencies and trade associations that represent companies in the oil and natural gas industry, (2) recent studies of natural gas producers' profitability, (3) some of the many methods that can be used by natural gas producers to separate the common costs incurred in producing natural gas and oil, and (4) the two basic accounting methods used by natural gas producers to report joint natural gas and oil profits.

This letter summarizes the results of our work and its enclosure provides additional details. Our review, which was conducted

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between January 1983 and August 1983, was performed in Washington, D.C., at eight federal agencies and three industry trade associations. We also contacted officials from accounting firms, consumer groups, financial investment organizations, and universities. Details on our objectives, scope, and methodology are presented in the enclosure.

The federal agencies and industry trade associations we contacted do not collect data that show the amount of profits producers earn through natural gas production activities. To determine natural gas production profits, it is necessary to know the amount of revenues received through the sale of natural gas and the expenses incurred in producing the natural gas so that expenses can be deducted from revenues to derive profits. While several of the federal agencies and one of the trade associations we contacted collect data that show the revenues from natural gas sales, the data they collect on natural gas production expenses are combined with data on expenses incurred in the production of oil.

Natural gas and oil expense data are combined because producers incur common expenses, such as exploratory drilling and land leasing expenses, before they can determine whether oil, natural gas, neither substance, or both substances will be discovered. For example, recent industry statistics indicate that over 50 percent of exploratory drilling activities in the United States result in neither oil nor natural gas being discovered in economical quantities. Other expense data, such as labor expense data, are also combined because natural gas is frequently extracted from wells that also produce oil. For example, during 1981 about 20 percent of U.S. natural gas production was extracted from wells that also produce oil.

While natural gas producers can use many methods to separate the common costs incurred in producing natural gas and oil, no single method is generally accepted within the industry. The many methods that can be used vary based on individual company policies for cost accounting. Furthermore, the profit estimates that result can differ depending on the method used.

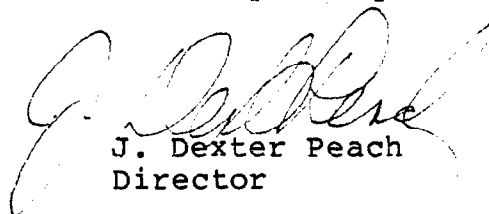
In addition, natural gas producers can use two basic financial accounting methods to account for costs incurred in searching for natural gas and oil. Under one method, the costs of successful and unsuccessful efforts to find oil and natural gas are placed in asset accounts and charged as expenses against income as the reserves that are found are produced. Under the other method, the costs of successful efforts are placed in asset accounts and charged to expenses against income as the reserves that are found are produced, but the costs of unsuccessful efforts are charged as

expenses against current period income. These financial accounting methods can result in different reported profits for combined oil and natural gas activities.

Although natural gas profit data are not available at federal agencies and trade associations, studies have recently been performed to estimate natural gas producer profitability. We examined three such studies. Two studies were performed by private organizations and one study, which is currently being finalized, was performed by the Department of Energy's Energy Information Administration. These studies were not comparable because they were based on different assumptions and estimating methods and covered different time periods. For example, one study estimated a 10.3 percent return on investment in natural gas production for 1982 to 1983. Another study estimated that the 24 largest natural gas producers received profits before taxes of \$4.3 billion in 1978 and \$10.1 billion in 1982.

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As your offices requested, we did not obtain agency comments on this report. Also, as arranged with your offices, we plan no further distribution of this report until 7 days from its date of issuance. At that time, we will send copies of the report to the Director, Office of Management and Budget, and the eight federal agencies and three industry trade associations contacted during our review. We will also send copies to other interested parties, and make copies available to others upon request.



J. Dexter Peach
Director

Enclosure

NATURAL GAS PROFIT DATAOBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of our review were to obtain information on (1) the extent to which profit data and related financial data on natural gas production are collected by federal agencies and trade associations that represent companies in the oil and natural gas industry, (2) recent studies of natural gas producers' profitability, (3) some of the many methods that can be used by natural gas producers to separate the common costs incurred in producing natural gas and oil, and (4) the two basic accounting methods used by natural gas producers to report joint natural gas and oil profits.

We held discussions with officials from federal agencies, trade associations, accounting firms, consumer groups, financial investment organizations, and universities. Based on these discussions and as agreed with your offices, we selected the following federal agencies and trade associations for our review: Energy Information Administration (EIA), Department of Commerce, Internal Revenue Service, Securities and Exchange Commission, Department of the Interior, Federal Trade Commission, Federal Energy Regulatory Commission, Department of Justice, Natural Gas Supply Association, Independent Petroleum Association of America, and American Petroleum Institute.

We interviewed officials and analyzed natural gas-related documents at these agencies and associations. The documentation included natural gas profit studies, company annual financial reports, and periodic reports filed with federal agencies. We also surveyed accounting literature, concentrating on the oil and natural gas industry.

During our work, we identified three recent analytical studies of natural gas profitability performed by the Citizen/Labor Energy Coalition (a consumer advocacy group), the Washington Analysis Corporation (an investment firm subsidiary), and EIA. We learned of these studies through discussions with representatives from industry and academia who are knowledgeable of the natural gas area. Because the results of the EIA study have not been published, our summary of this study was based on (1) interviews with EIA officials responsible for the study, (2) a technical paper on the study approved for release by EIA at an economic symposium in September 1983, and (3) a draft report on the study circulated for comment by EIA in March 1983. EIA plans to issue its final report in September 1984. Our summaries of the two other studies were based on analyses of the studies' reports and discussions with the studies' authors.

We reviewed these studies to determine the methodologies and analytical approaches they used to estimate natural gas production profitability. We did not independently verify the accuracy of the data nor test the analytical approaches used in these studies. Brief synopses of the three studies are presented in this enclosure to illustrate the study approaches and assumptions.

Our review was performed in accordance with generally accepted government auditing standards.

AVAILABILITY OF NATURAL GAS PROFIT
AND RELATED FINANCIAL DATA

To identify natural gas production profits, it is necessary to know specifically the amount of revenues obtained through the sale of natural gas and the expenses incurred in producing the natural gas. Several of the federal agencies and one of the industry trade associations we contacted collect data that show the revenues of natural gas production. However, none of the agencies and associations we contacted collected the specific natural gas expense data required to derive natural gas profits. The data they collect on natural gas production expenses are combined with data on expenses incurred in the production of oil. A description of the natural gas production data that are available at the agencies and associations we contacted follows.

Energy Information Administration

Established in 1977 by the Department of Energy Organization Act, EIA is the focal point for developing and maintaining comprehensive federal energy information. EIA is responsible for collecting, analyzing, and publishing data and analyses relevant to energy resource reserves, production, demand, and technology. To fulfill its mandate, EIA performs numerous analyses and operates 84 data-gathering surveys.

The only EIA data collection effort that collects company profit data is the Financial Reporting System. Through this system, which is mandated under the Department of Energy Organization Act of 1977, EIA collects from major energy producing companies financial data on revenues, expenses, assets, liabilities, and sources and uses of funds. However, EIA collects combined oil and natural gas profit data. While these data show the total profits earned through combined oil and natural gas production activities, the data do not show the separate amount of profits that the producers earned through either their oil production activities or their natural gas production activities.

The annual data collected through the Financial Reporting System are aggregated and then published by EIA in a report entitled Performance Profiles of Major Energy Producers. The report examines year-to-year developments in the operations of 26 large U.S. energy companies on a corporate level, by major line of energy business, and by major functions within each line of business. For example, petroleum is a line of business and refining/marketing is a major function within this line of business.

In developing the system, EIA decided to collect combined oil and natural gas expense data. While we could not determine from EIA records or discussions with EIA officials specifically why EIA decided not to require separate oil and natural gas expense data, a letter from one of the large oil companies commenting on the system's development indicated that separation of oil and natural gas expense data would be too burdensome and beyond the "state of the art" of accounting for oil and natural gas activities. Industry concerns centered on the difficulties in allocating joint oil and natural gas costs, such as exploration costs and the costs of wells not completed.

Other federal agencies

The other federal agencies we contacted also collect certain financial data on natural gas production but do not collect data on natural gas profits. A description of the types of data collected follows:

- The Department of Commerce collects financial data from the oil and natural gas industry and publishes aggregate industry revenue data and certain expense data, such as drilling expense data, in three publications: Current Industrial Reports, Annual Survey of Oil and Gas; Census of Mineral Industries, Oil and Gas Field Operations (collected and published once every 5 years); and Quarterly Financial Report for Manufacturing, Mining and Trade Corporations.
- Under the authority of the Internal Revenue Code, the Internal Revenue Service collects, through tax returns, financial data from the producers of natural gas. Aggregate oil and natural gas industry data are then published biannually in the Internal Revenue Service's publications entitled Corporation Income Tax Returns, Statistics of Income and annually in its Source Book, Statistics of Income, Corporation Income Tax Returns.
- As required by the Securities Act of 1933 and the Securities Exchange Act of 1934, the Securities and Exchange Commission annually collects and makes available to the

public extensive financial data pertaining to the performance of over 9,000 companies. These companies include all major natural gas producers that raise capital from securities offered in the national securities exchanges.

--The Department of the Interior collects monthly data on the volume and market value of natural gas produced on federal and Indian lands under the Mineral Leasing Act and Federal Oil and Gas Royalty Management Act of 1982. The Department annually publishes these aggregate data in a publication entitled Royalties: A Report on Federal and Indian Mineral Revenues.

--The Federal Trade Commission, the Federal Energy Regulatory Commission, and the Department of Justice also gather financial data, although often only on an as-needed basis for specific regulatory analyses, cases, or proceedings.

Trade associations

The Natural Gas Supply Association, the Independent Petroleum Association of America, and the American Petroleum Institute are three major trade associations representing companies in the oil and natural gas industry. These associations accumulate oil and natural gas financial data from government agencies and individual companies and publish industry statistics. Natural gas producer profit data are not collected.

The Natural Gas Supply Association's membership includes about 80 companies which produce about 95 percent of the Nation's natural gas. It presents selected statistics on the regulatory and legislative aspects of the natural gas industry, such as the prices of natural gas for producers. The Independent Petroleum Association of America represents several thousand producers of oil and natural gas. It publishes an annual report entitled The Oil Producing Industry in Your State. This publication includes data on U.S. petroleum and natural gas values, production, reserves, exploration, and development. The American Petroleum Institute represents a cross section of about 300 oil companies. Many of these companies also produce natural gas. The Institute publishes monthly, quarterly, and annual statistics on the number, depth, and costs of oil and natural gas wells in the United States.

STUDIES ON NATURAL GAS PROFITABILITY

While the federal agencies and industry trade associations we contacted during our review do not collect data that show the amount of profits producers earn through natural gas production

activities, we noted three studies that have been performed to estimate natural gas producer profitability. We examined studies performed by the Citizen/Labor Energy Coalition, the Washington Analysis Corporation, and EIA. These studies were based on a variety of assumptions concerning natural gas revenues and expenses. As discussed below, the studies are not comparable because they (1) used different assumptions, (2) used different methods to estimate profits, and (3) covered different time periods.

In June 1983, the Citizen/Labor Energy Coalition reported that the 24 largest natural gas producers received profits before taxes of \$4.3 billion in 1978 and \$10.1 billion in 1982.¹ According to the report, the Coalition based its analysis on several publications including the Annual Survey of Oil and Gas, a publication of the Bureau of the Census, Department of Commerce; natural gas producers' annual financial reports to shareholders; and reports filed with the Securities and Exchange Commission. According to the report, the Coalition estimated profits using the following approach:

1. Revenues were derived by multiplying the average wellhead selling price of natural gas by the quantity of natural gas sold.
2. Expenses were estimated by applying many assumptions to company financial data based on historical industry data. For example, production costs incurred on wells producing oil and natural gas were separated based on aggregate industry production cost data for wells that produced either oil or natural gas.
3. Estimated natural gas production expenses were then deducted from natural gas revenues to derive profits.

In May 1982, the Washington Analysis Corporation estimated the profitability of new U.S. natural gas production from 1967 to 1983.² The estimates were obtained through the use of a model that the Corporation developed by making a variety of assumptions. For example, to allocate various expenses between natural gas and oil, the Corporation determined the ratio between footage drilled for natural gas wells and footage drilled for oil wells

¹The Profitability of Natural Gas Production, Citizen/Labor Energy Coalition (Washington, D.C.: 1983).

²Profit Expectations for New Natural Gas Production, Washington Analysis Corporation (Washington, D.C.: 1982).

and applied the same ratio in allocating costs. The Corporation used historical data in making its analysis, such as data from the Department of Commerce and the Joint Association Survey on Drilling Costs, an annual publication of industry trade associations.

The Corporation's study estimated the profitability of producing newly discovered natural gas. Based on its analyses, the Corporation estimated a 10.3 percent return on investment in natural gas production for 1982 to 1983, down from the peak rate of return of 17.7 percent in 1975.³ In addition, the Corporation estimated returns for the categories of natural gas specified in the Natural Gas Policy Act of 1978.⁴ For example, deep gas (gas produced from wells drilled below 15,000 feet) had an estimated return of 30 percent with an assumed selling price of \$8 per thousand cubic feet.

As of February 1984, EIA was completing its report on its recent study of natural gas profitability.⁵ The EIA study was based on information from EIA and industry data sources and incorporated many assumptions in deriving profitability estimates, such as assumptions on natural gas production rates and cost allocations.

In performing its study, EIA estimated the natural gas prices that would be required to yield a 15 percent discounted cash flow rate of return after taxes on various assumed investments in natural gas development and extraction activities which do not also produce oil. Development activities involve the drilling and equipping of economical wells. Extraction activities involve the removing of natural gas from the well for sale. According to an EIA official responsible for the study, EIA has not integrated the costs of exploration activities into the discount analysis because

³Based on many assumptions, this is a hypothetical return on new natural gas production that is not produced in conjunction with oil. This internal rate of return, also referred to as a discounted cash flow rate of return, is a measure often used for project investment decisionmaking.

⁴The Natural Gas Policy Act of 1978, among other things, established eight major price categories and additional subcategories, depending on when a well is drilled, how deep the well is, and other criteria. Allowable prices for these categories vary widely.

⁵An Economic Analysis of Natural Gas Resources and Supply, Energy Information Administration (Washington, D.C.: 1983).

such an integration would have required numerous additional assumptions, particularly assumptions on separating the common costs that were incurred to find oil and natural gas.

While the EIA study has not yet been finalized, one of the study's authors summarized part of the study's analysis in a technical paper presented at a March 3-4, 1983, Hydrocarbon Economics and Evaluation Symposium.⁶ The paper presented a matrix of 288 price estimates stratified by natural gas field size, well depth, and geographic region. Price estimates ranged from \$0.09 per million British thermal units (Btu's)⁷ for a large field (over 10 trillion cubic feet), shallow well (2,500 feet deep) in south Texas, to over \$10 per million Btu's for a small field (approximately 0.2 billion cubic feet), deep well (17,500 feet) in all contiguous U.S. regions.

METHODS TO SEPARATE OIL AND NATURAL GAS COSTS

Producers can use different methods to allocate exploration, development, and extraction costs to oil or natural gas activities. Most natural gas is produced by companies that also produce oil, and these companies incur land leasing, drilling, and other costs that are associated with both oil and natural gas discovery activities. Because the costs incurred by producers relate to both oil and natural gas, it is necessary to allocate these joint costs between oil and natural gas production to determine the profits of each type of production.

For example, in conducting their exploratory drilling activities, oil and natural gas producers generally do not know for certain whether oil, natural gas, neither substance, or both substances will be discovered. Oil and natural gas production statistics show that over 50 percent of the exploratory drilling activities undertaken result in wells that produce neither oil nor natural gas. In addition, other expense data, such as labor expense data, are also combined because natural gas is frequently extracted from wells that also produce oil. For example, during 1981 about 20 percent of the U.S. natural gas production was extracted from wells that also produce oil.

⁶J.H. Wood, "Economics for Nonassociated Gas Production by Field, Size, Depth, and Region," Society of Petroleum Engineers Hydrocarbon Economics and Evaluation Symposium (1983), p. 57.

⁷A British thermal unit is the quantity of heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit.

Furthermore, after producers incur joint costs, there is no single method generally accepted within the oil and natural gas industry for separating costs between oil and natural gas activities. The many methods that can be used can vary based on individual company policies for cost accounting. For example, joint costs, such as exploratory drilling costs, can be allocated to oil and natural gas production activities in proportion to the revenues received from oil and natural gas sales. These joint costs also can be allocated on the basis of the relative heat content of oil and natural gas expressed in Btu's.

FINANCIAL ACCOUNTING METHODS

Accounting standards for the oil and natural gas industry, as well as other industries, are established in the private sector by the Financial Accounting Standards Board. Also, the Securities and Exchange Commission regulates financial accounting and reporting to the Commission for companies that raise capital from securities offered on the national securities exchanges. The Board's standards and the Commission's regulations, which are generally consistent, require specific disclosures on oil and natural gas producing activities, such as disclosures on the quantity of proven oil and natural gas reserves and the method of accounting used to report on the activities. The accounting standards and regulations also allow two basic methods of accounting for costs incurred in searching for oil and natural gas--the successful-efforts method and the full-cost method.

The application of these methods can affect the reported profits for company oil and natural gas activities. As discussed below, a company that incurs costs in unsuccessful efforts to discover oil or natural gas and that uses the successful-efforts method would generally report lower current profits than it would if it used the full-cost method.

Natural gas producers using the successful-efforts method of accounting sold about 74 percent of the natural gas sold in the United States in 1981.⁸ Under this accounting method, costs that are related to actual discoveries or development of oil and natural gas reserves are placed in asset accounts and charged as expenses against income as the reserves that are found are produced. However, costs of unsuccessful efforts to discover oil or natural gas (nonproductive costs) are charged as expenses against current period income. The accounting method is based on the

⁸Current Industrial Reports, Annual Survey of Oil and Gas, 1981, U.S. Department of Commerce (Washington, D.C.: 1983), p. 32.

premise that the costs of unsuccessful efforts to discover oil or natural gas should be charged as expenses against income as soon as a well is determined to be unsuccessful because these wells do not produce economical quantities of oil or natural gas and have no future benefits. Because these costs are charged as expenses from current income, a producer using the successful-efforts accounting method generally would report lower current profits than it would if it used the full-cost accounting method, which is discussed below.

Natural gas producers using the full-cost method of accounting sold about 22 percent of the natural gas sold in the United States in 1981.⁹ Under this method, all costs--including costs of successful and unsuccessful efforts to find oil and natural gas--are placed in asset accounts and charged as expenses against income as the reserves that are found are produced. The rationale for using the full-cost method is that the costs of both successful and unsuccessful discovery and development efforts are associated with the total reserves that are found. Because costs are not charged as expenses against income until the reserves that are found are produced, a producer using the full-cost accounting method generally would report higher current profits than it would if it used the successful-efforts accounting method.

⁹U.S. Department of Commerce, p. 32. The remaining 4 percent of 1981 sales was made by producers using a combined successful-efforts/full-cost accounting method or some other method.